M62502FP

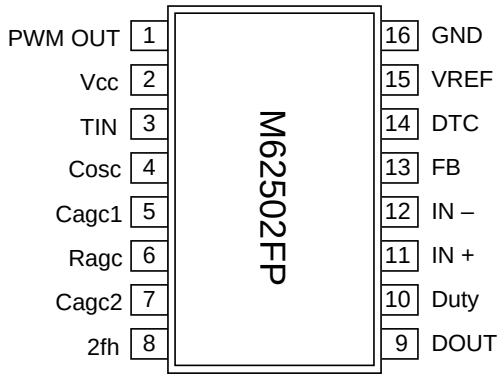
PWM IC for the synchronized deflection system control

GENERAL DESCRIPTION

The M62502 is a controller for a deflection system of CRT display monitors. It performs a stable PWM control over a wide fluctuation of external signals, thanks to the built-in trigger mode oscillator. The IC is suitable for an application to a high voltage drive and a horizontal output correction of CRT monitors because of its following circuits and functions;

- Under Voltage Lock Out circuit (UVLO)
- Soft-start function

PIN CONFIGURATION(TOP VIEW)



Outline 16P2N-A

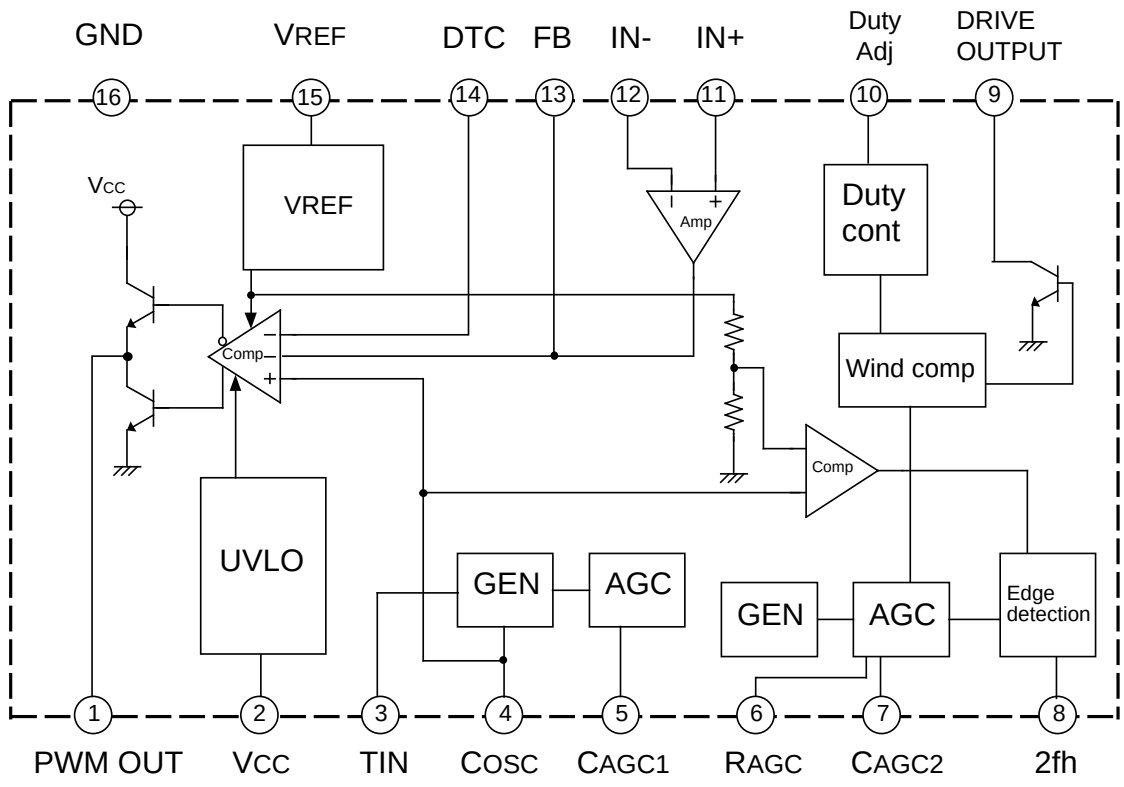
FEATURES

- PWM output synchronized with external signals
- Wide PWM control frequency
  15kHz to 150kHz
- Soft start function
- Low voltage malfunction protection circuit
  start Vcc > 9V
  stop Vcc < 6V

APPLICATION

- C R T display monitor

BLOCK DIAGRAM



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Terminal Number and The facility

PIN No.	Symbol	Functional Description
1	PWM OUT	PWM output
2	VCC	Power supply
3	TIN	Trigger input
4	COSC	Setting oscillating frequency
5	Cagc1	AGC setting
6	RAGC	AGC Current setting resistor connected to this terminal
7	Cagc2	AGC setting
8	2fh	Double velocity reshuffle
9	DOUT	Drive output
10	Duty	Duty regulation
11	IN+	Positive input of Op-Amp.
12	IN-	Negative input of Op-Amp.
13	FB	Output of Op-Amp.
14	DTC	Dead time control (Soft start function)
15	VREF	Output of reference voltage (5V)
16	GND	Ground

Absolute Maximum Rating (Ta=25°C,unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{OUT}	Output voltage		15	V
I_{OUT}	Output current		±100	mA
Vd	Drive output voltage		15	V
Id	Drive output current		20	mA
V_{ICM}	Error amplifier input common mode voltage range		-0.3 to VCC	V
V_{ID}	Error amplifier input common mode voltage		VCC	V
P_d	Power dissipation		650	mW
K_θ	Thermal derating ratio	Ta≥25°C	5.2	mW/°C
Topr	Operating ambient temperature		-20 to +75	°C
Tstg	Storage temperature		-40 to +150	°C

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ELECTRICAL CHARACTERISTICS (Vcc=12V, TIN=40kHz, Ta=25°C, unless otherwise noted)

Block	Symbol	Parameter	Test conditions	Limits			Unit
				Min	Typ	Max	
	V_{CC}	Range of power supply		VCC OFF		14	V
	I_{CC}	Circuit current	Output off mode		25		mA
Reference voltage section	V_{REF}	Reference voltage		4.80	5.00	5.20	V
	Reg-in	Input regulation			1.0	10	mV
	Reg-L	Load regulation			2.0	20	mV
	TC_{VREF}	Reference voltage thermal coefficient			0.01		%/°C
	$I_{REF\ MAX}$	Maximum reference current			-30		mA
	I_S	Short-circuit current			-30		mA
Error Amp.	V_{IO}	Input offset voltage				7	mV
	I_{Ib}	Input bias current		-100			nA
	I_{IO}	Input offset current		-100		100	nA
	V_{ICM}	Common mode input voltage range		-0.3		VCC-2	V
	AV	Open loop transmission gain		70	110		dB
	SR	Slew rate			4		V/µs
	V_{OR}	Output voltage range		0.3		VREF-1.5	V
	I_{sink}	Output sink current		10			mA
	I_{sourse}	Output source current				-10	mA
Oscillator	f_{OSC}	Oscillation frequency		15		150	kHz
	$V_{OSC\ H}$	The oscillator waveform bound voltage			3.5		V
	$V_{OSC\ L}$	The oscillator waveform lower limit voltage			1.5		V
	$V_{TIN\ H}$	High level of TIN		2.5		VCC	V
	$V_{TIN\ L}$	Low level of TIN				1.0	V
PWM output section	$V_{sat\ L}$	Output saturation voltage L	IO=100mA		0.7	1.4	V
	$V_{sat\ H}$	Output saturation voltage H	IO=-100mA	9.5	10.5		V
UVLO section	$V_{TH\ ON}$	ON threshold voltage		8.0	9.0	10.0	V
	$V_{TH\ OFF}$	OFF threshold voltage		5.4	6.0	6.6	V
Duty adj section	IDuty	Input current	VDuty=2.5V	-6.5	-1.3	-	µA
	Duty max	Maximum ON duty	VDuty=3V		5.0		µsec
UVP section	V_{UVPO}	Input offset voltage	Id=10mA			0.4	V
	$I_{IN\ UVP}$	UVP terminal input current	VDO=12V			1.0	µA
fh reshuffle section	Ifh	fh terminal current	Vhf=5V	-	330	430	µA
	Vfh	fh reshuffle voltage		0.4VREF	0.5VREF	0.6VREF	V

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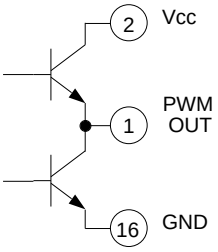
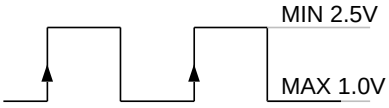
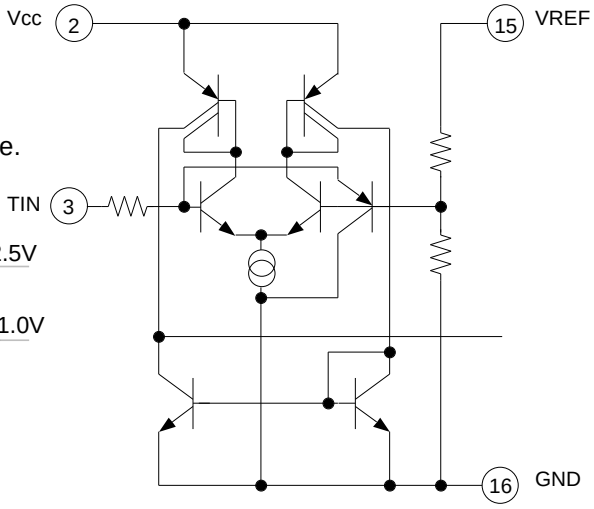
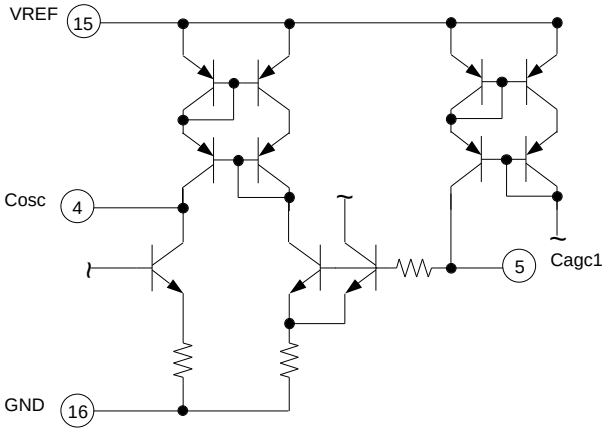
Terminal functional description and equivalent circuit

Terminal No	Symbol	Function and internal circuit
1	PWM OUT	PWM output • PWM output synchronized with the TIN input is available. • Output "H" level = 10.5V typ (The output current:-100mA,Vcc=12V) • Output "L" level = 0.7V Typ (The output current:+100mA,Vcc=12V) 
2	Vcc	Power supply
3	TIN	Trigger input • Frequency range 15kHz to 150kHz • It is taken on a leading edge. TIN input waveform  
4 5	Cosc Cagc1	A saw-wave oscillator timing setting (Cosc) • A saw-wave is generated by connecting the capacitor between pin4 and GND. • Recommended capacitor value is 1000pF. Setting AGC sensitivity (Cagc) • The sensitivity of AGC circuit is set by connecting the capacitor between pin5 and GND. • Recommended capacitor value is 1µF. 

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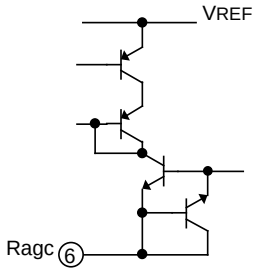
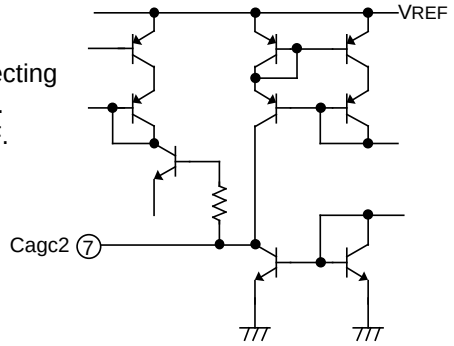
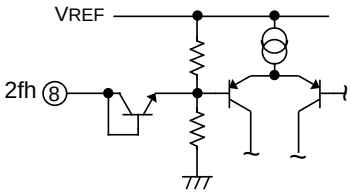
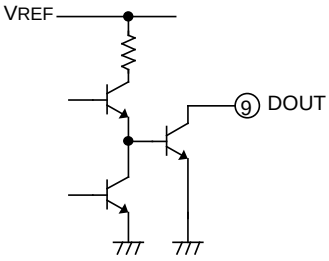
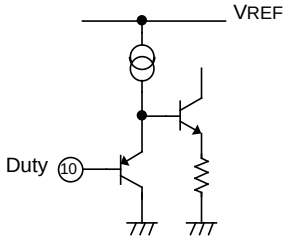
Terminal No.	Symbol	Function and internal circuit
6	Ragc	AGC current setting • The resistor is connected between pin6 and GND for setting AGC current flowing in DOUT circuit. 
7	Cagc2	Setting AGC sensitivity • The sensitivity of AGC is set by connecting the capacitor between pin7 and GND. • Recommended capacitor value is 1µF. 
8	2fh	Frequency selection • The frequency of drive output is alternated between just(f_h) and doubled($2f_h$) one. OPEN, GND : f_h VREF : $2f_h$ 
9	DOUT	Drive output • Open collector circuit. 
10	Duty	The duty adjustment of drive output 

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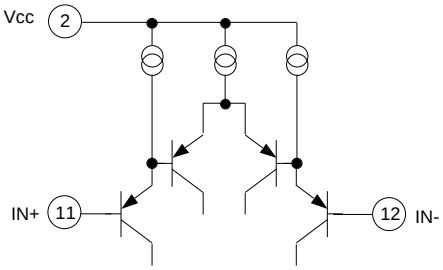
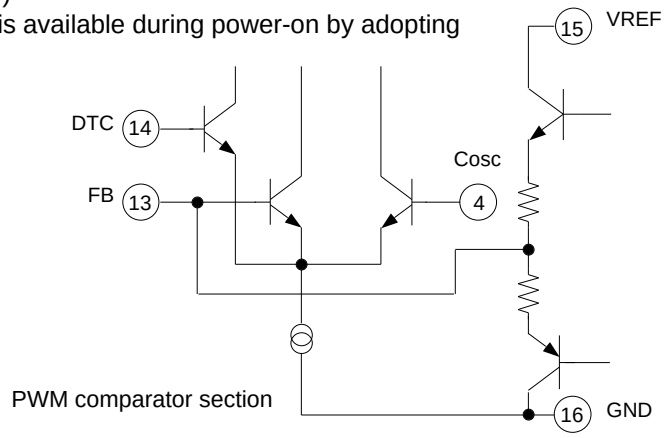
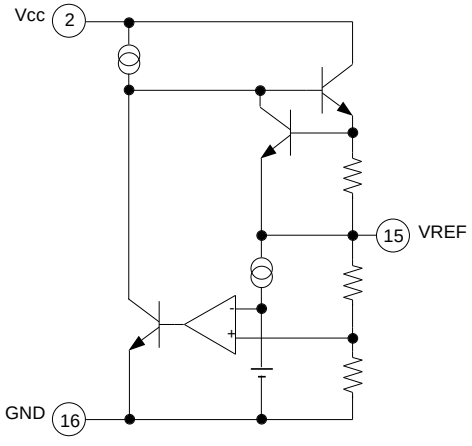
Terminal No.	Symbol	Function and internal circuit
11 12	IN+ IN-	Positive input of Op-Amp (IN+) Negative input of OP Amp (IN-) 
13 14	FB DTC	Output of Op-Amp (FB) Dead time control (DTC) • A soft start function is available during power-on by adopting a time constant. 
15	VREF	Reference voltage terminal • 5V is output via this terminal. A current capability is 5mA. 
16	GND	• Ground

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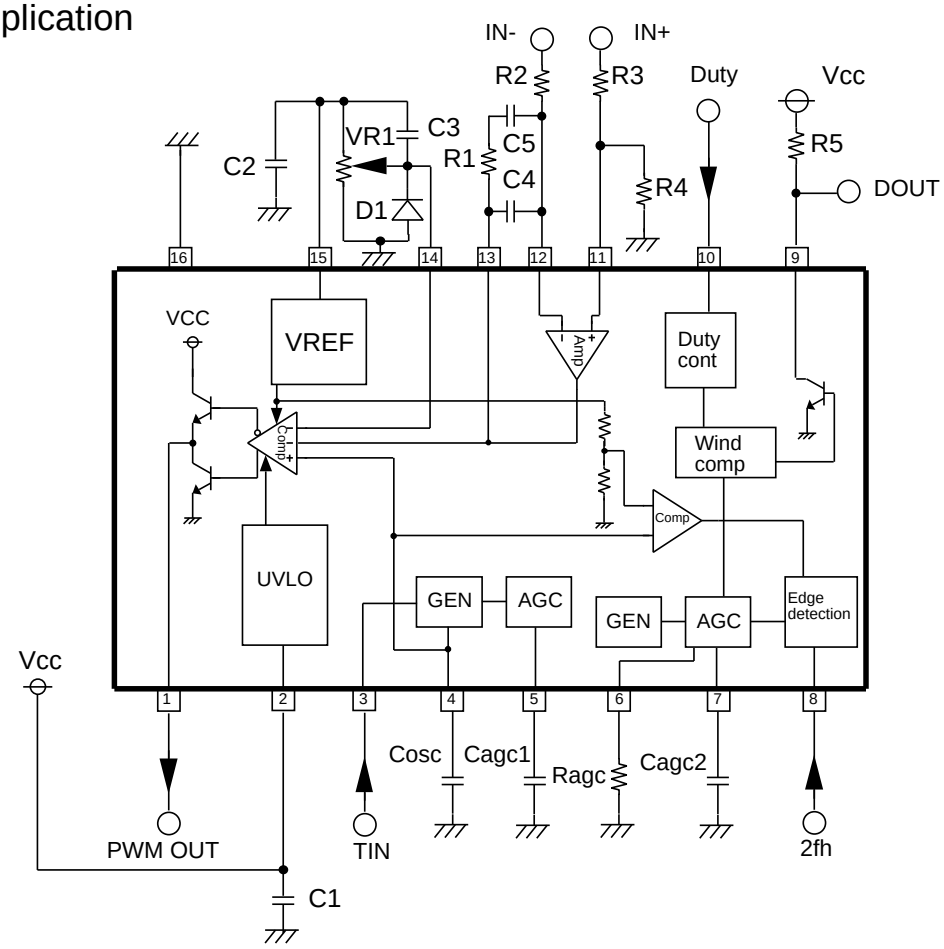
M62502 application



C1,C2 ---------- These capacitors are for stabilization of Vcc and VREF.

VR1 ---------- It is decided considering a current capability of VREF. (The capability is about 5mA.) Recommended value is around 10kΩ

C3,D1 ---------- They are for a soft start function. A time constant is decided considering VR1.

Cagc1,2 ---------- These capacitors are for stabilization of AGC circuit. A larger capacitor improves a stability of the system, however a system response is degraded. Recommended capacitor value is around 1µF.

Cosc ---------- This capacitor is for the saw-wave generation. Recommended capacitor value is around 1000pF.

R1,R2,R3,R4 ----- They are for the gain setting of the error Amp. R2 should be several kΩ to dozens of kΩ
C4,C5 to set a voltage gain 20dB to 40dB at f = 1kHz, so that the feed back loop is stable. When the voltage gain is too low, it causes jitter. Recommended values of C4, C5 and R1 are ; C4 = dozens of pF to several hundreds pF, C5 = several thousands pF to tens of thousands pF, R1 = dozens of kΩ to several hundreds kΩ.

Ragc ---------- This resistor is for the AGC setting of DOUT. Recommended value is 27kΩ.

R5 ---------- It is a pull-up resister of DOUT output, because DOUT is configured by the open collector circuit. Recommended value is several kΩ.